



POLISH NATIONAL AGENCY  
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<b>name of the unit:</b> <b>DIVISION OF DIAGNOSTICS AND AUTOMATICS OF TURBOMACHINERY</b> Institute of Turbomachinery, Lodz University of Technology		<b>symbol:</b> <b>I-12</b> <a href="http://www.imp.p.lodz.pl">http://www.imp.p.lodz.pl</a>
<b>head of the unit:</b>  Prof. Zbigniew Kozanecki, PhD, DSc	<b>potential promoters:</b>  Jakub Łagodziński, PhD, DSc	<b>contact person:</b>  Jakub Łagodziński, PhD, DSc phone: 48-42-631-23-87 <a href="mailto:jakub.lagodzinski@p.lodz.pl">jakub.lagodzinski@p.lodz.pl</a>
<b>scope of activities:</b> <p>The search for new solutions of turbomachines with special technological requirements increases the interest in the technology of untypical support of the rotating shafts of these machines. More and more often, specific functional conditions make an application of traditional, commonly known solutions in the support system of the machine rotating shaft difficult or even impossible. This applies in particular to machines operating in closed, hermetic flow circuits or in machines operating under unusual temperatures. Bearings and supports, the design of which employs the principle of operation or a working medium that is unusual for a given field of application, are called unconventional bearings. An interesting alternative to the development of this technology is the use of the turbomachine working medium as a lubricant.</p> <p>Due to the complexity and variety of modern technical solutions of turbomachines, knowledge from many fields related to thermodynamics, fluid mechanics, materials engineering, manufacturing technology, tribology and dynamics should be combined at the stage of their design. The operation of these machines places equally high demands, because also here interdisciplinary knowledge on an interaction of phenomena related to their operation is an essential factor in correct and safe operation. The basic element of these activities is the use of numerical methods for technical analyses of new machine design concepts, with particular emphasis on the dynamics of the rotating system, which determines the reliability of performance and the competitiveness of innovative technical solutions of turbomachines.</p> <p>A separate and very important issue is the technical implementation of prototypes and technology demonstrators of the proposed technical solutions, because their correct operation allows for real interest of potential industrial partners in the development and implementation of the proposed technologies into industrial practice.</p>		  



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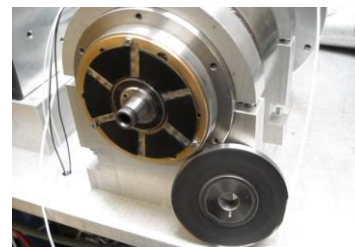


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present activities:

The main areas of interest and directions of the research currently carried out at the Division are the following issues:

- design of prototypes and technology demonstrators of innovative turbomachines with unconventional bearings,
- development of design and tests of new generation foil gas bearings and their implementation into prototype high-speed turbomachines,
- analyses, numerical simulations and expert opinions related to the dynamics of industrial machines working in chemical and petrochemical industries,
- HCF and LCF tests, as well as dynamic and destructive tests of prototype components of the helicopter power transmission system conducted on test stands designed at the Division of Automatics and Diagnostics of Turbomachinery.



future activities:

Developing current research directions and building new, more complex numerical models that will describe more accurately the dynamic properties and the physics of phenomena in unconventional technical solutions of machines under investigation.

keywords:

turbomachines, unconventional bearings, dynamics of rotating systems, shaft fatigue tests, foil bearings, gas bearings

list of internship proposal in this research team:

- Co-operation in tests and generation of numerical models of rotating systems of turbomachines